

**11th.**—St. Paul, Minn., thunderstorm.  
**12th.**—Near Nashville, Tenn., near Kirksville, Ohio, and Springfield, Mo., thunderstorms.  
**14th.**—Concord and West Milan, N. H., rainstorms. Steele, N. Dak., windstorm.  
**15th.**—Sarcxie, Mo., and Colby, Kans., thunderstorms. East Lynne, Mo., and Meade, Kans., windstorms. Cherokee, Kans., windstorm; 1 person killed and 1 injured. Near Harlan, Iowa, thunderstorm; 1 person and stock killed by lightning.  
**16th.**—Americus, Ga., and Fairford, Ala., thunderstorms. Augusta, Ga., Longshore, S. C., and Silver Creek, Wash., windstorms. Waynesboro, Palo Alto, and Agricultural College, Miss., hailstorms.  
**17th.**—Tampa, Fla., thunderstorm.  
**21st.**—Duluth, Minn., windstorm.  
**22d.**—Westfield, Mass., thunderstorm; a man killed by lightning.

**23d.**—Anson, Tex., windstorm.  
**24th.**—Orange Park, Fla., thunderstorm. Benton, Tex., windstorm; 15 persons injured. Pinopolis, S. C., and Lytle, Tex., hailstorms.  
**25th.**—Camden, Ark., hailstorm; 2 persons injured. Kirby, Ark., hailstorm. In Meeker County, Minn., thunderstorm; a man and horse killed by lightning. Near Luverne, Minn., thunderstorm; a man killed by lightning. Valley Springs, Minn., thunderstorm; a man killed by lightning.  
**27th.**—Houma, La., thunderstorm. Paradise, Nev., windstorm.  
**28th.**—Algona and Sioux City, Iowa, thunderstorms. Near Butlerville, Utah, thunderstorm; 1 person and 2 horses killed and 1 person injured by lightning.  
**29th.**—Carroll, Iowa, thunderstorm; 5 persons killed by lightning. Ovid, Iowa, and Omaha, Nebr., thunderstorms.  
**30th.**—Whitehall, Wis., thunderstorm; 1 person killed by lightning.

### ATMOSPHERIC ELECTRICITY.

The statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

The dates on which reports of thunderstorms for the whole country were most numerous were: 1st, 84; 9th, 94; 12th, 104; 13th, 91; 25th, 127; 26th, 137; 27th, 162.

Thunderstorms were most numerous in Florida, Iowa, Massachusetts, Minnesota, Missouri, Nebraska, and Ohio.

Thunderstorms were most frequent in Florida, where they were recorded on nineteen days; Iowa and Missouri, eighteen days; Nebraska, seventeen days; Georgia, Kansas, North Carolina, and Tennessee, sixteen days.

**Auroras.**—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 4th to the 12th, inclusive. On the remaining twenty-one days of this month 128 reports were received, or an average of about 6 per day. The dates on which the reported number especially exceeded this average were: 10th, 23; 11th, 47; 16th, 25; 19th, 19.

Auroras were reported by a large percentage of observers as follows: New Hampshire, 100; North Dakota, 80; Maine,

100; Minnesota, 35; Wisconsin, 33; Montana, 33; and Washington, 20.

Auroras were most frequent in: Wisconsin, on fourteen days; Minnesota, twelve days; North Dakota, eleven days; and Maine, ten days.

#### CANADIAN DATA—THUNDERSTORMS AND AURORAS.

Auroras were reported as follows: 1st, 2d, Winnipeg. 5th, Medicine Hat and Battleford. 9th, Winnipeg. 10th, Grand Manan, Quebec, Montreal, and Kingston. 11th, Grand Manan, Father Point, Quebec, Montreal, Kingston, Winnipeg, Minnedosa, Medicine Hat, Edmonton, and Battleford. 12th, Sydney, Charlottetown, Father Point, Minnedosa, and Prince Albert. 13th, Winnipeg, Medicine Hat, Prince Albert, and Edmonton. 16th, Sydney, Grand Manan, Yarmouth, Charlottetown, Father Point, and Port Arthur. 17th, Father Point and Medicine Hat. 18th, Father Point, Port Arthur, and Qu'Appelle. 19th, Grindstone, Yarmouth, Father Point, Winnipeg, Qu'Appelle, and Prince Albert. 20th, Father Point, Montreal, Port Arthur, Winnipeg, Minnedosa, Qu'Appelle, Medicine Hat, and Swift Current. 21st, Grindstone. 22d, Kingston. 24th, Father Point and Minnedosa. 25th, Winnipeg and Minnedosa. 26th, Quebec, Port Arthur, and Minnedosa. 27th, Quebec. 29th, Winnipeg.

Thunderstorms were reported on the 25th at Halifax and on the 26th at Yarmouth.

### METEOROLOGY AND MAGNETISM.

By Prof. FRANK H. BIGELOW.

For general remarks relative to this subject see page 7 of the REVIEW for January, 1895.

The comparison of the air temperature with magnetic horizontal force is shown in detail on Chart V, and the special features of the April curves are as follows:

#### SPECIAL FEATURES OF THE APRIL CURVES.

It is evidently desirable to make the record of comparison between the variations of the magnetic and meteorological systems as complete as possible. The space formerly devoted to the San Antonio observatory is therefore filled by inserting the mean barometer reading of 10 northwest stations, namely,

Huron, Pierre, Moorhead, Bismarck, Williston, Havre, Helena, Miles City, Rapid City, Idaho Falls, and Salt Lake City. The variations are inverted in plotting, the pressure being inverse while the temperature is direct relatively to the magnetic force. The pressures of this region are set back one day for synchronism in April and the succeeding summer months. Thus, April 2 is written and plotted against April 1 to allow for the eastward drift of the highs and lows.

For slope the correction to Williston is  $-1$ , for Toronto  $-1$ , and for Washington  $-1$ . For reduction to the zero base-line the correction for temperature means is  $-5$ , and for magnetic force  $+19$ .

## INLAND NAVIGATION.

The *extreme and average stages of water* in the rivers during the current month are given in Table VII for regular river stations of the Weather Bureau, from which it appears that none of the large rivers there recorded actually attained to the danger line during the month, but several rose nearly to that point. The principal high waters were: New Orleans on the 8th; Evansville, 20th; Pittsburg, 11th; Lynchburg, Charleston, and Circleville, 9th.

In the Delaware, Susquehanna, and Lehigh rivers ice broke up on the 9th and 10th, and the rivers were so swollen by heavy rains that Lambertville, Trenton, Flemington, Belvidere, Stroudsburg, Water Gap, Lehigh, Easton, Bordentown, Portland, all on the Delaware, and Binghamton, Susquehanna, Oakland, Sunbury, Williamsport, Wilkesbarre, all on the Susquehanna, suffered severely. The flood was the highest since 1841 at some places, but in general since 1862 in the Delaware, and since 1865 in the Susquehanna. The Hudson from Troy to Kingston was highest on the 9th and 10th. At Troy on the 10th the Hudson was 18 inches below the high-water mark of 1884; 24 below that of 1876 and 5 feet below that of February, 1857. Lake Skaneateles was one inch above the old high-water mark on the 5th.

The Merrimac River at Lowell on the 16th, 9 a. m., was 11 feet 2 inches above the dam and beyond the reach of the self-registering river gauge; at Haverhill the highest since 1869;

Concord, N. H., beyond all previous record; Plymouth, N. H., within 8 inches of the flood of 1869.

The Connecticut River was highest at Holyoke on the 16th and 17th; at Turners Falls, on the 16th, 5 inches above all previous maxima; at Hartford, 25 feet 8 inches on the gauge, within 1 foot of 1869; at Hanover, N. H., 22 feet above low water.

*Maine.*—The Androscoggin at Livermore Falls was, on the 16th, higher than for fifty years past, exceeding "the great pumpkin flood" of 1867. The Little Androscoggin at Paris and the Presumpscot at Westbrook were highest on the 15th, exceeding the flood of 1878; at Norway the water was higher than since 1869. The Kennebec at Gardiner and the Biddeford at North Saco and as far up as Berlin, N. H., were higher than in 1843, but the absence of ice diminished the damage, although that was still quite severe. Many dams and bridges were destroyed on the 15th and 16th.

*Virginia.*—The James was highest at Lynchburg on the 10th, but still 2 or 3 feet below danger line. The Reed River was highest at Wytheville on the 8th, but still 2 or 3 feet below the high water of 1878. From this point down the New River and the Kanawha to the Ohio high water prevailed.

*North Carolina.*—The Catawba, Tar, Yadkin, and Neuse rivers were highest on the 8th, 9th, 13th, and 18th, respectively, and much damage was done and some lives lost.

## STATE WEATHER SERVICES.

By Mr. JAMES E. BERRY, Chief of State Weather Service Division.

The following extracts are given in regard to the general weather conditions experienced in the several States and Territories as reported by State Weather Service Directors:

*Alabama.*—The weather conditions of the current April contrasted very favorably with those of the previous month. The temperature was very nearly normal and there was more than the average amount of sunshine. The rainfall was not very evenly distributed, and although it was decidedly below the average ( $-1.46$ ), yet owing to the excess of the previous month nothing really suffered for want of it.

*Arizona.*—The temperature of the current month was about  $4^{\circ}$  above the normal with precipitation 0.4 of an inch below.

*Arkansas.*—From the 1st to the 26th the temperature was, with a few exceptions, generally below the normal, but from the 27th to the end of the month, it averaged about  $6^{\circ}$  per day above. The maximum of  $98^{\circ}$  reported at Pochontas on the 30th was the highest ever recorded in the State during April. During the greater part of the month the nights were too cool for the rapid growth of vegetation and germination of seeds, but the weather was excellent for all kinds of farm work which progressed well. The precipitation was deficient ( $-2.69$ ), and the germination of seeds planted late was, therefore, retarded. Showers during the last week of the month did much good and caused cotton, corn, oats, and gardens to grow nicely. The stands of all crops are reported good and the outlook for all crops very favorable. The fruit and berry crop promises an abundant yield.

*California.*—The average temperature for the month was  $0.2^{\circ}$  above the normal. The highest temperature,  $108^{\circ}$  was reported from Palm Springs on the 13th; and the lowest,  $5^{\circ}$ , from Bodie on the 5th. The precipitation averaged 0.96 of an inch below the normal.

*Colorado.*—The mean monthly temperature for the current month was  $3.3^{\circ}$  higher than the normal, while the precipitation averaged 67 per cent of the normal.

*Connecticut.*—(See *New England*.)

*Delaware.*—(See *Maryland*.)

*Florida.*—The mean temperature for the current month was  $3^{\circ}$  below the normal, and the precipitation 2.26 inches above. The greatest rainfall, 7.64 inches, was reported from Fort Meade.

*Georgia.*—The month was mild and pleasant with no storms of marked severity. There was a sharp fall in temperature on the morning of the 4th which carried the mercury below the freezing point in the most northerly counties, and resulted in light frosts as far south as the counties of Worth and Irwin. The rainfall averaged about 2.00 inches above the normal.

*Idaho.*—There was a decided fall in temperature on the 5th accompanied by killing frosts, particularly in the southern portion. The mean temperature for the current month was  $1.5^{\circ}$  higher than that for April of last year, while there was a deficiency in rainfall of 0.97 inch from that for the corresponding period last year.

*Illinois.*—The rapid increase in temperature of April over March is a marked characteristic of the State; this month, April, 1895, the increase in general warmth was nearly one-half of the March temperature. The maximum temperature for the month was  $98^{\circ}$ , and occurred at Decatur on the 30th; the minimum was  $20^{\circ}$ , and occurred at Zion on the 2d. Rainfall was largely deficient in the northern and southern sections, the general deficiency for the State being 1.47 inch, the average rainfall for the month being 2.08 inches. The month was generally highly favorable for the preparation of farm land and seedling. Frosts were common in northern and central counties until the 22d. Very little vegetation was far enough advanced to be injured.

*Indiana.*—The average temperature for the State during the month was  $2^{\circ}$  above the normal and the rainfall, which fell only on a few days in small quantities, was 1.36 inch below the normal. Snow fell only on two days in small quantities. Moderate thunderstorms formed on several days in localities.

*Indian Territory.*—(See *Oklahoma*.)

*Iowa.*—The mean temperature for the State for the current month was  $54.2^{\circ}$ , about  $6^{\circ}$  above the normal. The highest temperature reported was  $98^{\circ}$ , on the 24th, at Glenwood. The average rainfall was about the normal for the month. It was unequally distributed, 5.88 inches, the greatest amount reported, falling at Guthrie Center, while only 0.28 of an inch was reported from Clifton.

*Kansas.*—The average temperature for the current month was  $58.6^{\circ}$ , being  $3.5^{\circ}$  in excess of the normal. The average precipitation, 1.29 inch, showing a deficiency of 1.07 inch.

*Kentucky.*—The distribution of temperature for the month was remarkably uniform throughout the State, the mean of the central and western sections being practically the same, and only slightly in excess of that of the mountain districts. The average temperature exceeded the normal by  $1.2^{\circ}$ . The high temperatures of the last ten days of the month, with abundant sunshine, served to stimulate to a vigorous growth all vegetation which had been retarded by earlier unfavorable weather conditions. Light frosts were reported on the 14th and 15th, but resulted in only slight damage to crops. The average precipitation for the month, 3.18 inches, was less than the normal by 0.62 of an inch.

*Louisiana.*—The mean temperature for April, 1895, averaged over